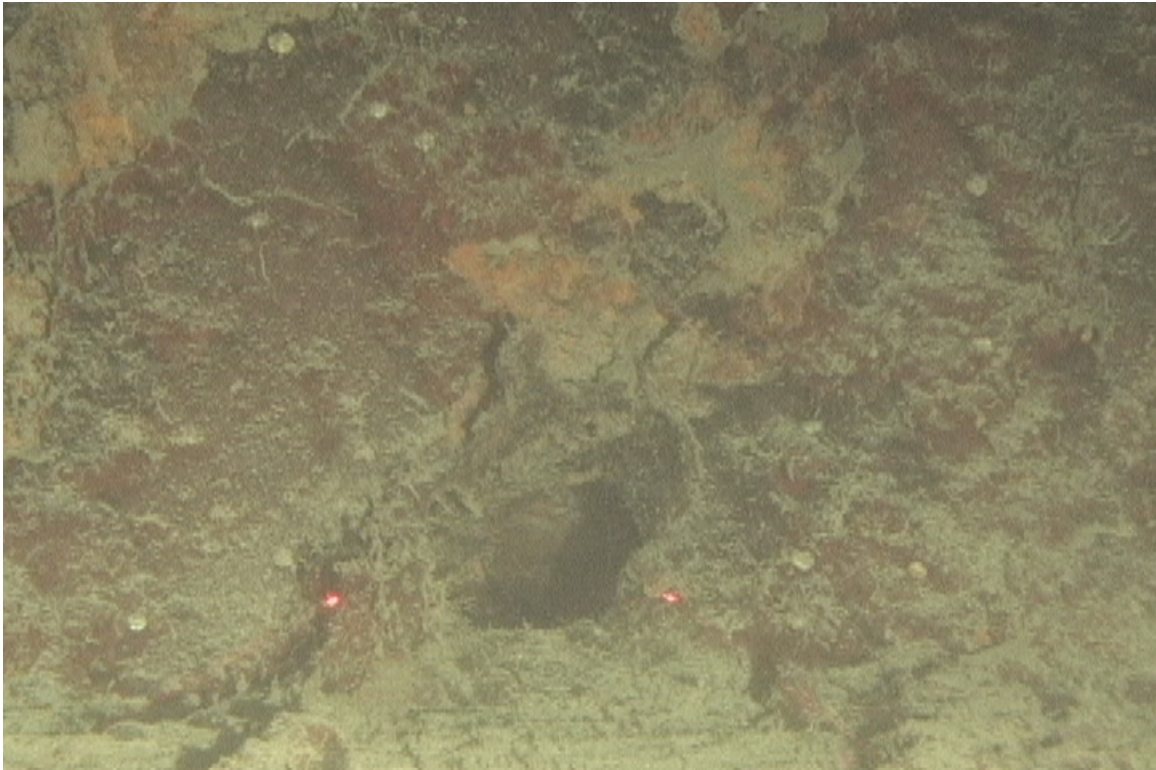


## New Analysis of the Cannon Hole in the Sail of the Ward Midget Sub

12/19/2003



This photo, taken on December 16, 2003 from the Pisces V submersible, shows the cannon hole in the sail of the midget sub created by the shot from the #3 gun of the USS Ward. The laser scale was found to be slightly out of calibration when checked after the dive. Depending on the exact distance the submersible was from the hole, the distance between the dots ranged between 8.88-9.50 inches. Measuring the hole from the upper left to lower right yielded a diameter ranging between 3.9-4.1 inches which corresponds to the size of the shell fired by the Ward. Of particular interest is the apparent “flap” of metal from the outer skin of the hull which is projecting out from the upper right hand side of the hole. The flap appears to be peeled back and outward from the center of the entrance point of the shell, a fact which would seemingly be useful in calculating the angle and direction from which the shot was fired.

Three hypotheses are submitted here to stimulate discussion and possible ideas for experimentally recreating the event. The first hypothesis is that the shot came from the left, which is the direction of the stern of the midget sub. A relatively sharp angle of penetration depressed most of the metal at the entrance point but forced a flap of metal upward and outward on the opposite side of the hole. The second hypothesis is that the shot came from the left with the flap initially being depressed inward and secondarily being forced outward. The third hypothesis is that the shot came from the right, from the direction of the bow. Again, this would require the flap to be initially displaced inward and subsequently outward after impact. Historical eye-witness accounts all state that the Ward crossed in front of the sub before firing, which would support the third hypothesis.

The secondary outward projection of the flap could have resulted from physics similar to those eloquently demonstrated in Harold Edgerton's famous "shooting the apple" photograph published in 1964. Solid masses on the inside of the impact area that could have caused that effect were the periscope stand and, unfortunately, the ensign manning the periscope. Alternately, some other force, such as air exiting the hole as the midget sub sank, might have been the cause.